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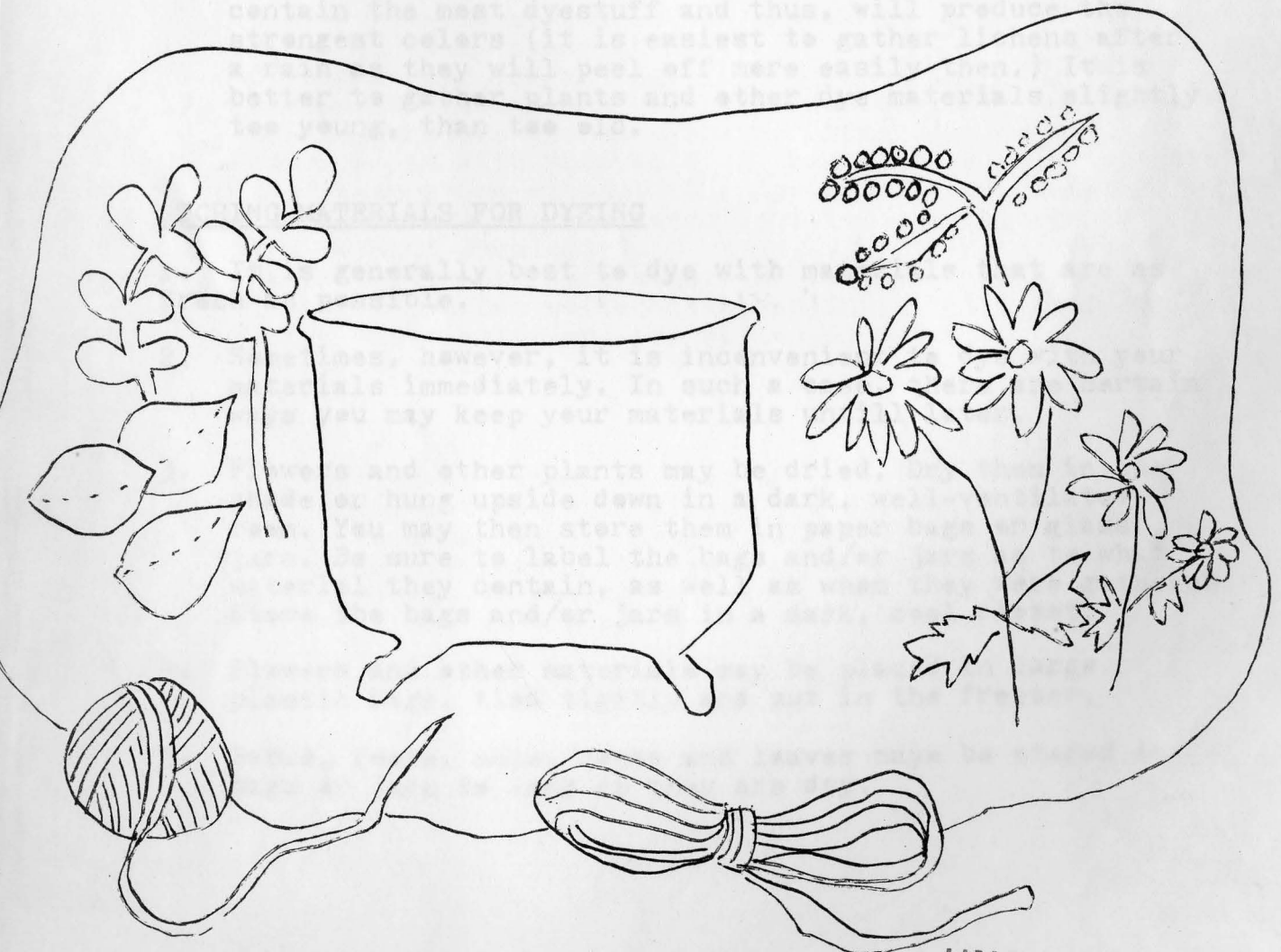
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A BRIEF INTRODUCTION TO NATURAL DYES

as presented by Jeanne Finan
and
Tom Eshelman

October, 1975



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GATHERING MATERIALS FOR DYEING

1. Be sure to make note of when and where your materials are gathered. It's best to keep a notebook to write this down, as it's a very useful reference to have in following years when you are comparing dyebaths or trying to reproduce a color.
2. Always remember to take something with you to collect the materials in. Paper bags will work; baskets are excellent. Also carry with you a sharp knife or a pair of kitchen scissors; depending on what material you are gathering you may need some other utensils (pruning shears, hatchet, etc.). It is much more ecological to cut flowers than to "pick" them, which often results in pulling the plant up with the roots.
3. Under most circumstances, plants are best gathered when they are in their "prime". Most flowers would be picked when they have just fully flowered; berries and seeds are best gathered just as they are ripe; leaves are best gathered when newly grown; roots are best picked in the autumn; lichens should be collected in August (for most varieties), since this is the time when lichens contain the most dyestuff and thus, will produce the strongest colors (it is easiest to gather lichens after a rain as they will peel off more easily then.) It is better to gather plants and other dye materials slightly too young, than too old.

STORING MATERIALS FOR DYEING

1. It is generally best to dye with materials that are as fresh as possible.
2. Sometimes, however, it is inconvenient to dye with your materials immediately. In such a case, there are certain ways you may keep your materials until later.
3. Flowers and other plants may be dried. Dry them in the shade or hung upside down in a dark, well-ventilated room. You may then store them in paper bags or glass jars. Be sure to label the bags and/or jars as to what material they contain, as well as when they were gathered. Store the bags and/or jars in a dark, cool closet.
4. Flowers and other materials may be placed in large plastic bags, tied tightly and put in the freezer.
5. Barks, roots, nuts, cones and leaves may be stored in bags or jars so long as they are dry.

6. The material may be boiled and the dyebath made up; then, the dyebath may be bottled (use plastic or glass containers, never metal, as this will affect the color). Unless you are going to freeze the dyebath liquid, you need to add one teaspoon sodium benzoate per gallon of hot dyebath. Seal in air tight containers
7. If freezing the dyebath put the container without top in freezer, then cover when liquid inside is frozen.

EQUIPMENT NEEDED FOR DYEING

1. A scale that will weigh fractions of an ounce.
2. A scale that will weigh up to two pounds.
- *3. Dyepots of enamel (Canning pots work quite well), glass or stainless steel.
4. Scissors and cotton cord for making skeins.
5. Yarn
6. Glass jars and plastic spoons (small sticks will work also) for mixing mordants for the dyebath.
7. Sink(s) or plastic basins for rinsing the yarn.
8. Sticks of smooth wood or glass towel rods for stirring the material.
9. Clothesline stretched in the shade.
10. Stove or other means of heat.
11. Chemicals for mordanting.
12. Thermometer (such as a candy thermometer) for measuring the temperature of the dyebath. After you become more experienced with natural dyes, you will be able to judge the temperature without the use of this thermometer.
13. Rubber gloves (if your hands tend to be sensitive to the mordant chemicals).
14. Water (preferably soft water--if you know that your water is hard, you can soften it by adding 1 TBSP. Calgon (or other water softener) per gallon of water.
15. Measuring cups.
16. Dyestuff.

* NOTE: Kettles of copper or iron may also be used if available but these kettles will affect the dye colors (which is often an advantage). Copper kettle will brighten the colors (approximately the same effect as using a copper post-mordant--blooming) and iron kettles will darken (sadden) the colors (approximately the same as using an iron post-mordant). AVOID kettles made of tin and aluminum as they will make both colors and wool harsh.

WASHING THE WOOL

In order that the mordant and/or dye may penetrate evenly the wool must be washed. Wool contains lanolin, a natural oil; it is necessary to wash the wool to get rid of this oil for the purpose of dyeing.

1. Wool may be washed in any mild soap such as Ivory. You will need about $\frac{1}{4}$ cup of soap per pound of wool per five gallons of water.
2. Be sensitivie to the wool and do not use too hot or too cold water for washing. Lukewarm (95 degress F.) is best.
3. Squeeze the wool gently while washing--do NOT wring it--and do not lift the wool above the water if possible. Agitate the suds bath gently.
4. Rinse the wool several times to be sure that all the soap has been removed. Be certain that the rinses are the same lukewarm temperature that the suds bath was. When finished rinsing, squeeze the water out of the wool with a gentle pressing movement. Do NOT wring or twist the skeins of wool.

WASHING COTTON Yarns

1. Make suds of a mild soap in hot, soft water. Use about $\frac{1}{2}$ cup of soap per pound of cotton in 5 gallons of hot (140 degrees F.) water.
2. Wash through 30 minutes, wring out the suds and wash in second suds, using half as much soap this time.
3. Rinse once in hot water.
4. For the second rinse have the water even hotter and let the cotton soak for at least 30 minutes.
5. Follow with 3 cooler rinses.

MORDANTING the YARN

The word MORDANT is derived from the French MORDRE and the Latin MORDERE meaning "to bite". Mordanting the yarn enables the dye color to "bite" or combine with the fiber. Different mordants make the yarn sensitive to different parts of the dye color. Thus, mordants influence the color of the yarn and also improve the fastness of the colors.

1. Chemicals used for mordanting :

POTASSIUM ALUM	POTASSIUM DICHROMATE
ACETIC ACID	STANNOUS CHLORIDE
AMMONIA	FERROUS SULFATE
LIME	COPPER SULFATE
CAUSTIC SODA	CREAM OF TARTAR

The most common mordants used are potassium alum(ALUM), potassium dichromate(CHROME) and stannous chloride (TIN).

2. There are 3 different times when mordanting can be done. The better and more controllable colors result when the mordanting is done BEFORE the dying. This is known as PRE-MORDANTING. The mordanting can also be done during the actual dyebath, to eliminate a separate process. This is known as the MONO-MORDANT method. This method saves time but the colors are seldom as bright or as fast to light and wear. Mordanting can also be done after the dying. This method is known as POST-MORDANTING, and is used (sometimes in combination with yarn which has already been pre-mordanted) to change the tone of the colors, or occasionally to give a brighter, stronger color.
3. Early mordants used in colonial times included leaves, roots, wood ashes, salt, vinegar, soda, sumac, hemlock, urine, and iron fillings.
4. Success of even dyeing depends on careful mordanting. Too much of a mordant will injure the fibers of the yarn. Thus, when weighing out mordants, care must be taken. Too much alum will make your wool sticky. Too much tin will leave the wool harsh and brittle. Too much chrome will impair the color. Too much iron will harden the wool.
5. Once the wool is mordanted it should be stored in a cool dark place and should, for best results, be used as soon as possible. Some dyers prefer to wrap the wool in plastic and refrigerate it until using (wool should be allowed to return to room temperature before dying).
6. Yarn may be dyed without any mordant(this is known as the DIRECT or NON_MORDANT or SUBSTANTIVE method); however, with a few exceptions(such as walnut hulls) the dye will not be as fast or as strong a color.

7. Be sensitive to your yarn. Wool in particular must be handled carefully and sensitively. Wool is a very alive fiber and has a tendency to mat, or felt, together when handled improperly. Pressure, moisture and a severe temperature change will cause the wool to felt. Always tie your skeins loosely and preferably in 2 or 3 places. Always pre-soak the wool before mordanting or dyeing (this also helps the dye and mordant penetrate the yarn more evenly). Enter the wool in bath at approximately the same temperature it has been soaking in. Raise the temperature of the bath slowly and gently; simmer the wool--NEVER BOIL IT!!! Always stir the bath gently. These guidelines apply to both mordanting and dyeing the wool. Allow the wool to cool in the pot after mordanting and again after dyeing.

Processes of Mordanting (for WOOL)

A. ALUM (Potassium Alum)

1. Use 3 oz. per pound of wool for fine or medium weight wool or 4 oz. per pound for heavy weight wool.
2. Dissolve the alum in boiling water in a small jar.
3. Empty the chemical into a pot of warm water.
4. Put in the pre-soaked yarn.
5. Bring to a simmer within 20-30 minutes.
6. Simmer one hour at about 200 degrees F.
7. Stir gently occasionally.
8. Let yarn cool to room temperature in the pot.
9. Rinse in warm water and dry in the shade.
10. Store in a dark place.

B. CHROME (Potassium Dichromate)

1. Use $\frac{1}{2}$ ounce per pound of wool
2. Follow the exact same procedure as for ALUM.
3. Chrome is sensitive to light and thus your chemical should always be stored in the dark (preferable in a dark bottle or jar). Also, keep your dyepot covered when using chrome and be certain to store the chrome-mordanted yarn in a dark, light proof container.

C. TIN (Stannous Chloride)

1. use $\frac{1}{2}$ ounce of tin and $\frac{1}{2}$ ounce of cream of tartar per pound of wool.
2. To use tin as a pre-mordant
 - a. dissolve the tin in warm water and dissolve the cream of tartar in boiling water
 - b. add both to a pot of warm water.
 - c. add the pre-soaked yarn and bring to a simmer.
 - d. simmer one hour and cool in the pot.
 - e. rinse with soap and then rinse thoroughly with warm water (until rinse water is clear)
 - f. dye as soon as possible and after dying rinse with soap again.
3. To use tin as a blooming agent (post-mordant)
 - a. yarn must be previously mordanted with alum or chrome.
 - b. twenty minutes before the end of the dyebath, dissolve the tin in warm water and the cream of

tartar in boiling water.

- c. turn off heat(or remove pot from heat) and remove yarn.
- d. add the chemicals and stir.
- e. add theyarn and simmer for 20 minutes.
- f. cool and rinse with soap.

D. IRON (ferrous sulfate)

1. Use 1/3 ounce per pound of wool
2. Iron saddens or greys the color.
3. Dissolve the iron in boiling water and follow the same procedure as for using tin as a blooming agent.

E. COPPER (copper sulfate)

1. Use $\frac{1}{2}$ ounce of copper per pound of wool
2. Follow the same procedure for tin blooming.
3. Copper brings out the green tones and it can be used alone to produce a pale aqua color.

Mordanting and dyeing other fibers than wool is a very long procedure with only fair results.

Mordanting silk

1. Colors will be weaker than they would be on wool, however, any of the mordants which were used with wool may be used with silk.
2. Use 4 ounces of ALUM per pound of silk; with other mordants use the same proportions as for wool.
3. Handle the skeins of silk VERY CAREFULLY. The bath temperature should never excee a temperature of 165-180 degrees F. (USE YOUR THERMOMETER).
4. Simmer mordant bath only 45 minutes.

Mordanting Cotton

1. For each pound of cotton fiber or material use 8 ounces of alum, 2 ounces of washing soda (sodium carbonate) and 2 ounces of tannic acid.
2. First day: dissolve 4 ounces of the alum and 1 ounce of the soda in warm water; place in about 4 gallons of cold soft water. Immerse material(which has been soaked overnight) in the bath and heat gradually. Boil one hour and cool in the pot overnight.
3. Second day: Take the material out, squeeze out the moisture, rinse well. Dissolve the tannic acid in a bath of 4 gallons of water and immerse the material. Heat slowly to a temperature of 140-160 degrees F. and keep at this temperature for one hour. Cool and let stand overnight.
4. Third day: Make a bath using the remaining alum and soda.
5. Repeat steps one through four.

GENERAL RULES FOR PREPARING DYEING MATERIALS

1. Barks
 - a. soak overnight
 - b. boil for 2 hours
 - c. strain and use extract
2. Flowers and shoots
 - a. boil 15-30 minutes
 - b. strain and use extract
3. Leaves and stems
 - a. boil 1 hour
 - b. strain and use extract
4. Nuts and Hulls
 - a. Crush and soak overnight
 - b. boil 15-30 minutes
 - c. strain and use extract
5. Roots
 - a. grind and soak overnight
 - b. boil 15-30 minutes
 - c. strain and use extract
6. Lichens
 - a. Boiling water method
 1. soak overnight in water and vinegar
 2. boil one hour
 3. strain and use extract, adding a little more vinegar
 - b. Orchil method
 1. crush lichens
 2. soak in one part ammonia, two parts water for at least 30 days
 3. strain and use extract

SOME ADDITIONAL NOTES ON DYESTUFFS

BARKS

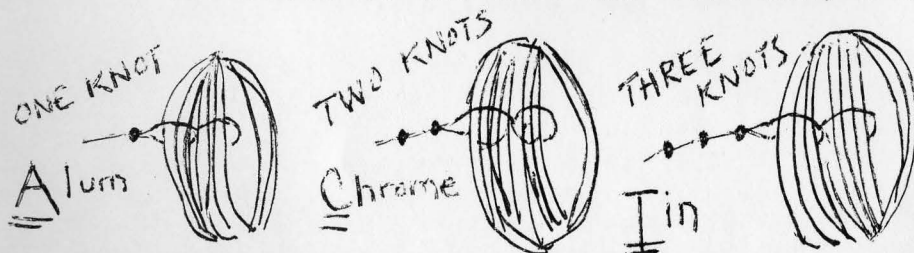
1. Black oak has the greatest coloring power. It will produce beautiful shades from light tan to dark brown on wool.
2. Barks are best collected in the fall or winter.
3. Generally, it is the inner bark that is used.
4. Barks may be used fresh or dried. Fresh will give stronger colors.
5. If drying barks for later dyeing, dry carefully so the bark doesn't become damp or moldy.

LICHENS

1. August is the best month for collecting lichens as this is the time that they contain the most acid and thus, produce the strongest, clearest dyes.
2. Lichens growing on stones or rocks generally produce better color than lichens growing on trees.
3. Be ecological when gathering lichens--don't take them all. They grow very slowly.

PRACTICAL HINTS

1. Make certain that your skeins are tied tightly (but not too tightly). You don't want the skein to come loose in the dyepot (which would result in a tangled mess) but you want it tied loosely enough so that the mordant and dye are able to penetrate all the fibers.
2. To distinguish the different mordanted skeins when they are all placed together in the dyepot, work out a system and use it consistently. My system is this:: For ALUM, I tie my skeins with ONE knot; with CHROME, I tie using TWO knots at the end; and with TIN, I use THREE knots.



3. Make certain that the mordants are thoroughly dissolved before you pour them into the dyepot (or else there may be bad stains on the wool).
4. Don't overcrowd your dyepot; be sure that your pot is big enough so that the skeins have enough room.
5. Use approximately 4 gallons of water for each pound of wool.

GENERAL DYEING PROCEDURES

1. Add the prepared dyestuff to a pot of warm water.
2. Add the presoaked yarns.
3. Bring to a simmer within 20-30 minutes.
4. Simmer and stir occasionally for one hour.
5. Cool in the dyepot.
6. Rinse in warm water until rinse water is clear.
7. Hang in the shade to dry.

AMOUNTS OF DYESTUFF REQUIRED

This varies considerably, but if you can't find a specific recipe, these are good rules of thumb to follow:

1. LEAVES: one peck
2. HULLS: one peck
3. BARKS : one peck
4. FLOWERS: $\frac{1}{2}$ -1 bushel of fresh flowerheads; 1 gallon of dried flowerheads

Usually, it is better to gather a bit too much than too little, for the more dye material the stronger the dyebath.

DYE RECIPES

These are just a few recipes for dyebaths. The books suggested in the bibliography will offer you many more. However, one of the most exciting things about natural dyeing is to discover new dye substances yourself. Don't rely too heavily on books. Experiment and try new plants--even if you haven't seen a recipe for it before. Have fun and be adventuresome. Only be certain to leave enough of any plant you gather so that it can re-seed itself and grow back in years to come.

QUEEN ANNE'S LACE : Use the entire stalk and flower of the plant; it takes about $\frac{1}{2}$ bushel of plants for this bath to achieve a lovely pale yellow with an alum pre-mordant, a darker yellow with tin, and a yellow-green with chrome as the pre-mordant.

MARIGOLDS: These flowers produce some of the loveliest and strong colors that nature offers. Use about one gallon of the blossoms (the entire stalk of the plant may also be used for slightly different shades of color) Alum gives a strong yellow dyed wool, chrome a rich, warm brown and the tin pre-mordant offers a vibrant orange. Marigolds may also be dried easily for a future dyebath, though the colors are not quite as strong.

BLACK WALNUT HULLS: This is one of the strongest dyes that nature has to offer. So strong, in fact, that one does not even need to mordant the wool to produce a fast, strong dye. It takes about $\frac{1}{2}$ peck of hulls to dye a pound of wool. The hulls must be soaked at least overnight and the longer they are soaked the stronger the dye. They produce a beautiful, beautiful brown shade of color.

ONION SKINS: This is a real treat for the colors produced from the outer brown skin of onions is fantastic! The only problem is that it takes one pound of onion skins to dye one pound of wool--and one pound of onion skins is a lot of onion skins. But all is not lost. Go to your grocer and offer to clean out the onion bin--you'll usually leave the store with enough skins for a nice dye pot. Alum gives an orange-yellow, chrome a orange-brown and tin gives a dazzling, electric orange.

SASSAFRASS: This will be one of the seeter smelling dyebaths you might have. You will want to use the bark or whole pieces of the root of the sassafrass tree. You will need at least one very large root, approximately 5 pounds for one pound of wool. The colors are beautiful browns with a rose colored tint to them.

YELLOWTOP or WILD MUSTARD: This is an abundant wildflower in Virginia and N.C. that appears in the early spring and continues blooming til early summer. It takes about a bushel of flowers (the entire stalk) to dye a pound of wool, but the bushel is not hard to collect. The alum and chrome pre-mordants produce pale yellow-

green colors but the tin is a dazzling bright yellow.

RHODODENDRON LEAVES: A bushel of these leaves very nice yellow-brown shades of color. If you use an iron pot rather than an enamel one, you will get lovely shades of grey. If you are lucky enough to have a copper pot to dye with you will be able to produce beautiful renaissance greens and golds.

BLACK EYED SUSANS: This common wildflower produces a lovely green with alum as the pre-mordant; a gold with chrome and a deeper gold with tin. It takes about $\frac{1}{2}$ bushel of flowers to dye one pound of wool.

BURDOCK: A good use for this sometimes pesky weed is to dye with it! For it produces lovely shades of yellow and yellow-green with about one bushel of the plant for one pound of wool.

CHAMOMILLE: Not only does this rocky-soil weed make a delicious tea but it also produces a brilliant yellow with tin, a lovely gold with chrome and a somewhat paler yellow with alum. It takes about a bushel of the entire plant.

GOLDENROD: This plant needs to be gathered for the dyepot as soon as it comes into bloom, for the best color results. It takes about a bushel of the plant (stalk and flower) to dye one pound of wool. Alum produces a nice, though slightly dulled, yellow; tin a bright yellow and chrome a brass color. If an iron pot is used or if you post-mordant with iron (ferrous sulfate), a beautiful olive green is produced with the chrome pre-mordant wool.

POKEBERRIES : It takes $\frac{1}{2}$ bushel of ripe pokeberries to dye one pound of wool. They give, as might be expected, lovely shades of red. This dye is not very colorfast but even the faded colors are a nice salmon sort of color. Mordanting with vinegar or using vinegar in the dyepot produces the strongest shade of red.

COFFEE GROUNDS: A good use for coffee grounds (at least 2 pounds of coffee) will produce nice beige colors on your wool.

BUTTERCUPS: If you're up to picking a bushel of buttercups you can have lovely yellow and copper-brown shades for your wool. This dyepot should be done outside where there is good ventilation as the fumes from this dyepot are not only irritating to your eyes and nose, but are, in actuality, mildly poisonous. So take care.

COREOPSIS: This is a common, daisy like yellow flower that grows along the roadside in summer and fall. Only a few flowerheads will produce a vibrant orange with tin, a lovely vermillion with Chrome and a quite pleasant yellow with alum.

DYE AND MORDANT SOURCES

1. Straw into Gold--P.O. Box 2904, 5550 College Ave., Oakland, California (carries excellent supplies for the spinner and dyer).
2. Sherman Research Company-- 1 So. St. Clair Street, Toledo, Ohio, 43602 (Excellent mordant supplier, reasonable prices and very fast (UPS) delivery).
3. (Dyestuffs) from: Wide World of Herbs, Ltd., 11 St. Catherine Street East, Montreal, Canada, H2X 1K3-----and-----Dominion Herb Distributors, Inc., 61 St. Catherine Street, Montreal, 129, Quebec.
4. Natures Fibers--Box 183, Woodstock, New York 12488.
5. Sheep Village--2005 Bridgeway, Sausalito, California 94965.
6. Kem Chemical Co.-- 545 S. Fulton, Street, Mt. Vernon, N.Y. 10550.
7. Jones Sheep Farm, Peabody , Kansas--(beautiful white and dark colored fleece for spinning and dyeing)(\$1.50/pound).
8. The Handweaver --460 First Street East, Sonoma, California 95476

9. Two Plants and Dyeing: A Handbook, Brooklyn Botanical Garden, Brooklyn, N.Y., 1964, \$1.65.

10. Recipes for Vegetable Dyeing, Ellen Seltzer, \$3.95.

Most of these books can be ordered from these craft book stores through the mail:

The Unicorn
Box 645
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P.O. Box 526
Pacific Grove, California 93950

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3. Vegetable Dyeing, Emma Conley, Penland School of Handicrafts, Penland N.C., \$1.00.
4. The Dye-Pot, Mary Frances Davidson, order from the author at 103 Maple Lane, Oak Ridge, Tennessee, 37832, \$2.00.
5. Natural Dyes, Sallie Pease Kierstead, Bruce Humphries, Inc. Boston, 1950, \$3.75.
6. Natural Dyes Plants and Processes, Jack Kramer, Scribners', New York, 1972.
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8. The Use of Vegetable Dyes, Violetta Thurston, The Dryad Press, Leicester, 1930, \$1.75.
9. Dye Plants and Dyeing: A Handbook, Brooklyn Botanical Garden, Brooklyn, N.Y., 1964, \$1.65.
10. Lichens for Vegetable Dyeing, Ellen Bolton, \$3.50.

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